

What is claimed is:

1. A phase shifter comprising:
  - a substrate;
  - 5 a tunable dielectric film having a dielectric constant between 70 to 600, a tuning range of 20 to 60 %, and a loss tangent between 0.008 to 0.03 at K and Ka bands, the tunable dielectric film being positioned on a surface of the substrate;
  - a coplanar waveguide positioned on a surface of the tunable dielectric film opposite the substrate;
  - 10 an input for coupling a radio frequency signal to the coplanar waveguide;
  - an output for receiving the radio frequency signal from the coplanar waveguide;
  - a connection for applying a control voltage to the tunable dielectric
  - 15 film, wherein the connection for applying the control voltage to the tunable dielectric film comprises:
    - a conductive strip;
    - a first electrode position adjacent a first side of said conductive strip to form a first gap between the first electrode and the conductive strip; and
    - 20 a second electrode position adjacent a second side of said conductive strip to form a second gap between the second electrode and the conductive strip; and
    - a conductive dome electrically connected between the first and second electrodes.
- 25 2. The phase shifter according to claim 1, wherein the high dielectric constant voltage tunable dielectric film comprises a barium strontium titanate composite.

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3. The phase shifter according to claim 1, further comprising:  
a first impedance matching section of said coplanar waveguide coupled  
to said input; and  
a second impedance matching section of said coplanar waveguide  
5 coupled to said output.

4. The phase shifter according to claim 3, wherein the first  
impedance matching section comprises a first tapered coplanar waveguide section;  
and  
10 wherein the second impedance matching section comprises a second  
tapered coplanar waveguide section.

5. The phase shifter according to claim 1, further comprising:  
a third electrode position adjacent a first side of said first electrode  
15 opposite said conductive strip to form a third gap between the first electrode and the  
third electrode; and  
a fourth electrode position adjacent a first side of said second electrode  
opposite said conductive strip to form a fourth gap between the second electrode and  
the fourth electrode.

20 6. The phase shifter according to claim 1, wherein the substrate  
comprises one of:

MgO, LaAlO<sub>3</sub>, sapphire, Al<sub>2</sub>O<sub>3</sub>, and a ceramic.

25 7. The phase shifter according to claim 1, wherein the substrate  
has a dielectric constant of less than 25.

8. The phase shifter according to claim 1, wherein the tunable  
dielectric film has a dielectric constant of greater than 300.

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9. The phase shifter according to claim 1, further comprising:  
a conductive housing covering the phase shifter.

10. The phase shifter according to claim 1, wherein the tunable  
5 dielectric film comprises one of the group of:  
barium strontium titanate ( $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$ , BSTO, where x is less than 1),  
BSTO-MgO, BSTO-MgAl<sub>2</sub>O<sub>4</sub>, BSTO-CaTiO<sub>3</sub>, BSTO-MgTiO<sub>3</sub>, BSTO-MgSrZrTiO<sub>6</sub>,  
and combinations thereof.

10 11. A reflective termination coplanar waveguide phase shifter  
comprising:  
a substrate;  
a tunable dielectric film positioned on a surface of the substrate;  
first and second open ended coplanar waveguide lines positioned on a  
15 surface of the tunable dielectric film opposite the substrate;  
microstrip line positioned on the substrate for coupling a radio  
frequency signal to and from the first and second coplanar waveguide lines; and  
a connection for applying a control voltage to the tunable dielectric  
film.

20 12. The reflective termination coplanar waveguide phase shifter  
according to claim 11, further comprising:  
microstrip divider coupling said microstrip line to said first and second  
coplanar waveguide lines.

25 13. The reflective termination coplanar waveguide phase shifter  
according to claim 11, wherein said first and second coplanar waveguide lines have  
different impedances.